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Effectiveness of Goat Milk Yogurt Starter Against Various levels of HDL, LDL and Triglycerides in male white rats (*Rattus norvegicus Wistar strain*)

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Abstract

Natural ingredients that can lower cholesterol in the body is a yogurt drink. Yoghurt goat milk is goat's milk fermented with lactic acid bacteria, particularly *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. The study aims to determine the effectiveness of goat's milk yoghurt with different types of starters on levels of HDL, LDL and triglycerides in male white rats (*Rattus norvegicus Wistar strain*).

The design of this research is true experimental with using post test only control group. The method used a completely randomized design with four groups: placebo control group, the group with starter *Lactobacillus Bulgaricus, Streptoccocus thermophilus*, and Mixed (*Lactobacillus Bulgaricus* with *Streptoccocus thermophilus*). Giving yogurt ad-lib. The observed variables include the levels of HDL, LDL and triglyceride blood of male rats (*Rattus novergicus Wistar* strain). Analysis of data using one way ANOVA test and LSD test.

The results showed that levels of HDL, LDL and triglycerides were significantly different. Conclusion goat milk yogurt with mixed starter of *Lactobacillus bulgaricus* and *streptococcus thermopilus* more effective than yogurt with only once starter. Recomendation in order to maintain health can take advantage of goat milk yogurt as a healthy beverage.

Keywords: Goat's milk yogurt, levels of HDL, LDL and Triglycerides

INTRODUCTION

Major public health problem today due to change unhealthy lifestyle is characterized by a high prevalence of non-communicable diseases (NCDs) and this is not only in Indonesia but also globally. According to the Ministry of Health (2007) and the World Health Organization (WHO) (2009), non-communicable diseases (NCDs) become the main cause of death globally. One of the PTM is cardiovascular as a result of high cholesterol levels or abnormal lipid levels (Thomas and S, Singh, 2014). Various types of synthetic drugs used in medicine for example for lowering koleserol with drug gemfibrozi, fenofibrate and bezafibrat from the group of acid fibrates that are usually used in patients hiperlipoproteinemia type III and hypertriglyceridemia severe side effects gastrointestinal disturbances such as nausea, diarrhea, flatulence, and other - others. Class of drugs such as cholestyramine and colestipol resins commonly used in patients with hypercholesterolemia, also give side effects such as nausea, vomiting, and constipation

Therefore, it is necessary to find an alternative treatment, especially from natural sources that are safer, does not have efeksamping and effective for use in the treatment of hiperkolesetrolemia namely by using fermented goat milk (yogurt). Goat milk is processed fermented yoghurt made has advantages compared with fresh goat milk. Several hypotheses about the decreased levels of cholesterol by Lactobacillus bacteria, namely: 1) the cholesterol that is in kimus eaten by bacteria, so that cholesterol is absorbed by the gastrointestinal tract decreases. 2) cholesterol can be bound to the bacterial cell surface or incorporated into the bacterial cell membrane or in convection becomes coprostanol by cholesterol reductase produced by a strain of Lactobacillus. 3) inhibited the formation of micelles by probiotik.Bakteri Lactobacillus strains can produce ferulic acid (FA), which can inhibit HMG-CoA reductase and sterol secrete acid, so that blood cholesterol levels can be decreased. (Duchesneau, et al. 2014).

Yogurt is a probiotic product. capable of providing a beneficial effect on health when consumed in sufficient quantities (Muhammadshahi, et al, 2014). This makes researchers are interested to know the effectiveness of goat's milk yoghurt starter against the various levels of uric acid, total cholesterol and blood glucose in male white rats (Rattus norvegicus Wistar strain).

RESULTS AND DISCUSSION

1.The Concentration HDL Results

Mean HDL levels at observation day to 31 male rats (*Rattus norvegicus Wistar* strain) is presented in Table 1.

Table 1. Average of HDL levels

Treatment	**Average concentration of HDL**
Placebo group / water	8,29[a]
Group of goat's milk yoghurt with Lactobacillus bulgaricus starter	9,29[a]
Group of goat's milk yoghurt starter streptococcus thermophilus	9,79[b]
Group of goat milk yoghurt with Lactobacillus bulgaricus starter mix and Streptococus thermophilus	10,06[c]

Note: Different letters in one column show significant differences.

The results of LSD test showed that the placebo group (water) was not significantly different from the treatment stater *Lactobacillus*, significantly different from *Streptococcus*, and the mixture (*Lactobacillus* and *Streptococcus*) .Group of placebo (water) have the lowest HDL compared to the treatment group, namely *Lactobacillus*, *Streptococcus* and mix (*Lactobacillus* and *Streptococcus*). The highest concentration of HDL obtained in Ussu goat yogurt treatment with a mixture of *Lactobacillus* and *Streptococcus* starters. The results of this study together with the results of research and Rustanti Sayekti (2013), as well as the results of research and Nuryanto and Naufalina (2015) is yogurt koro sword can also increase HDL cholesterol levels HDL.Increasing is due to saturated fatty acids in yogurt increases the secretion of apo A-1 from hepatocytes, increases the rate of transport of apo A-1, increasing the HDL particle size, and decrease the rate of catabolism fraction of apo A-1. Increasing the number and the rate of transport of HDL may be the mechanism of adaptation to the amount of cholesterol in darah.12,13 main fatty acid content increases HDL cholesterol levels are lauric acid, stearic, myristic, and palmitic and oleic unsaturated fatty acids.

2. The concentration of LDL Results

The mean levels of LDL in the observation of the day to 31 male rats (*Rattus norvegicus Wistar* strain) is presented in Table 2.

Table 2. Average of LDL Levels

Treatment	Average concentration of HDL
Placebo group / water	96,64[a]
Group of goat's milk yoghurt with *Lactobacillus bulgaricus* starter	63,99[b]
Group of goat's milk yoghurt starter *Streptococcus thermophilus*	65,76[b]
Group of goat milk yoghurt with *Lactobacillus bulgaricus* starter mix and *Streptococus thermophilus*	67,31[b]

Note: Different letters in one column show significant differences.

The results of LSD test showed that the placebo group (water) was significantly different from the treatment stater Lactobacillus, significantly different from Streptococcus, and the mixture (*Lactobacillus* and *Streptococcus*) .. The treatment of placebo (water) had LDL levels higher than those in other treatments, namely *Lactobacillus, Streptococcus* and mix (*Lactobacillus* and *Streptococcus*). Lowest LDL levels obtained in the treatment Ussu goat yogurt with Lactobacillus bulgaricus starter. The results of this study together with the results of research Towil and Pramod (2015), ie non-fat yogurt plus sinbiotik inulin from potato flour can lower LDL cholesterol significantly in mice with hypercholesterolemia. The decrease is due during the fermentation process koro sword with lactic acid bacteria helps prevent the increase in LDL cholesterol with β-glucosidase enzyme produced in large numbers. These enzymes hydrolyze into aglycone isoflavones and saponins. A compound free of aglycone isoflavones and saponins higher activity in preventing the increase in LDL cholesterol

3. Concentration Triglycerides Results

Mean triglycerides on the observation day to 31 male rats (*Rattus norvegicus Wistar* strain) is presented in Table 3.

Table 3. Average of Triglyceride Levels

Treatment	**Average concentration of Triglyceride**
Placebo group / water	96,83[a]
Group of goat's milk yoghurt with *Lactobacillus bulgaricus* starter	60,83[b]
Group of goat's milk yoghurt starter *Streptococcus thermophilus*	45,66[c]
Group of goat milk yoghurt with *Lactobacillus bulgaricus* starter mix and *Streptococus thermophilus*	41,66[c]

Note: Different letters in one column show significant differences.

The results of LSD test showed that the placebo group (water) was significantly different from the treatment stater *Lactobacillus*, significantly different from *Streptococcus*, and the mixture (*Lactobacillus* and *Streptococcus*) .. Triglycerides treatment of placebo (water) had higher levels than those in other treatments, namely *Lactobacillus*, *Streptococcus* and mixture (*Lactobacillus* and *Streptococcus*). Triglyceride levels streptococcus thermophilus starter equal treatment by treatment with a mixed starter. The results of this study together with the results of Pramesti and Kartasurya (2015) that administration of red bean yoghurt 225 ml / day for 15 days lowered triglycerides pre-menopausal women with dislipidemia.This is caused by bacteria fermented probiotic caused short chain fatty acids such as propionic acid. Propionic acid can lower triglyceride levels by inhibiting the lipogenesis in the liver,

it can cause a decrease in fatty acid synthesis. Fatty acids are the raw material for making triglycerides.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion: Based on the results and discussion of this study, it can be concluded as follows:

1. Yoghurt goat milk is effective in lowering the levels of LDL and triglycerides in male white rats (*Rattus norvegicus Wistar* strain).
2. Yogurt goat milk is effective in improving blood HDL levels in male white rats (*Rattus norvegicus Wistar* strain).
3. Overview of hematology there are significant differences between the three treatment groups with placebo
4. Goat milk yoghurt with starter mixture of *Lactobacillus bulgaricus* and *streptococcus thermopilus* more effective than a single starter yogurt.

Suggestion: The recommendation of the results of this study are:

1. In order to maintain health can take advantage of goat milk yogurt as a healthy beverage.

2. Making goat milk yogurt starter should use a combination of *Lactobacillus bulgaricus* with *streptococcus thermopilus* because it gives better effect on health.

3. Need to continue studies in humans with the same variable and expandable

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